Diesel Engine Retrofit Technology Verification

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The Environmental Issue

7.9 million heavy-duty diesel trucks and buses emit large amounts of particulate matter (PM), hydrocarbon (HC), and nitrogen oxide (NO_X) emissions. These emissions contribute to:

- Non-attainment of National Ambient Air Quality Standards (NAAQSs) in several areas of the country
- Serious public health and environmental problems, including premature mortality

More than 24 million children ride a bus to and from school each day. Children are particularly susceptible to diesel pollutants.

Trucking enterprises account for 30% of the transportation related PM emissions in the U.S.

ETV's Response

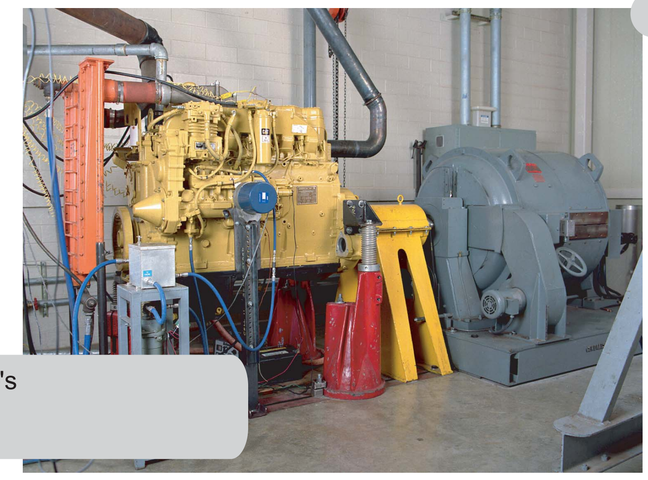
To verify the performance of seven diesel engine retrofit technologies in 2003/2004 designed to reduce PM emissions and associated HC and carbon monoxide (CO) emissions:

- Donaldson Company, Inc. (3)
- Clean Diesel Technologies, Inc. (2)
- Lubrizol Engine Control Systems (1)
- Clean Clear Fuel Technologies (1).

Percent Emission Reductions

Technology	PM	HC	CO
A	48 to 53	37 to 59	54 to 64
B*	29 to 34	0 to 42	31 to 35
C	77 to 76	88 to 90	58 to 74
D	86 to 95	88 to 100	71 to 87
E	22 to 28	49 to 66	38 to 41
F*	21 to 34	0 to 52	12 to 24
G	No reduction	No reduction	No reduction

*** Technology included a crankcase vent filter**



Southwest Research Institute's dynameter test cell

The Impacts

. . . of Verification Testing

ETV data have led to increased requests for proposals and enabled vendors to "participate in many national voluntary retrofit programs."

Assuming 10% of the current fleet of heavy-duty trucks and buses use an ETV verified retrofit technology for seven years, ETV estimates:[1]

- 8,980-31,300 tons of PM emission reductions after 7 years of use;[2]
- 683-2,380 avoided incidences of premature mortality; and
- $5,150-$17,900 (millions 1999$) in associated monetary benefits.

[1]Potential health and monetary impacts are based on a comparison to projected health and environmental impacts associated within PM reductions attributed to the 2007 Heavy-Duty Highway Rule.

[2]PM reductions calculated for technologies A-F.

Lubrizol

Clean Diesel Oxidation Catalyst Muffler

Donaldson Diesel Oxidation Catalyst Muffler

EPA OTAQ's Contribution

Office of Transportation and Air Quality (OTAQ)

- Served as an ETV stakeholder, provided key technical expertise
- Contributed to the development of three diesel engine retrofit verification protocols
  - Alternative Fuels, Additives, and Lubricants
  - Selective Catalytic Reduction
  - Exhaust Catalysts, Filters, and Engine Modifications
- These protocols are posted on OTAQ's Voluntary Diesel Retrofit Program (VDRP) Web site.

. . . of Verification and the ETV/OTAQ Partnership

Ultimately should help reduce the amount of state- or program-specific testing needed to:

- Demonstrate emission reduction performance
- Estimate pollutant reductions [e.g., to fulfill State Implementation Plan (SIP) requirements]
- Support Clean School Bus USA & State Programs, the Smartway Transport Program, etc.

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